

SPECIFICATION

TITLE OF THE INVENTION

LAND PLANE

BACKGROUND OF THE INVENTION

- 5 (1) 1. Field of the Invention: The present invention relates, in general, to agricultural implements, and in particular, to agricultural implements for smoothing any surface irregularities in a field.
- (2) 2. Background Art: Prior to planting an agricultural crop such as rice, cotton or soybeans, it is desirable to insure that the field is substantially level and free of surface
10 irregularities and the like. If a field has surface irregularities when a crop is planted, crop production can be affected due to inability to control water flow, standing water, excessive runoff, and the like. Since surface irregularities are typically caused by prior tilling, aeration, and harvesting procedures, it has become routine step for many farmers to level a field each time a crop is to be planted.
- 15 (3) Various agricultural implements have been designed for being pulled by agricultural tractors over cultivated fields in an attempt to level and remove surface irregularities from the fields. A preliminary patentability search in Class 172, Subclasses 799.5, 684.5, 673 and 675, produced the following patents, which appear to be relevant to the present invention:
- 20 (4) Elsey, U.S. Patent 1,166,197; Noffsinger et al., U.S. Patent 1,845,324; Berry, U.S. Patent 4,568,219; Miller, U.S. Patent 4,614,240; Berry, U.S. Patent 4,700,786; Springfield, U.S. Patent 4,898,247; Dunn et al., U.S. Patent 5,213,165; Kerpash Sr., U.S. Patent

5,890,546; Almer, U.S. Patent 6,119,792; and Martin, U.S. Patent 1,476,263.

- (5) To be transported over a typical state or county road or highway, land planes are typically limited in width to approximately sixteen feet (4.9 meters). However, in order to economically and properly level a field, a land plane must be sized to cover a
- 5 substantially large area in single pass over the field, and to provide sufficient drag when pulled over the field, etc. One solution is to use foldable wings so that the land plane can be folded up for transport over a road or highway, and unfolded for being pulled across a field to level the surface thereof. Dunn et al., U.S. Patent 5,213,165, discloses such a folding land plane. The Dunn et al. folding land plane has a length that is over 2.5 times
- 10 the deployed, in-use position width thereof. While the relatively long length of the Dunn et al. folding land plane provide the unit with sufficient drag and earth moving capability, the length also makes it more difficult to maneuver the land plane in the field during a land planing operation.
- (6) Nothing in the known prior art, either singly or in combination, discloses or
- 15 suggests the present invention.

BRIEF SUMMARY OF THE INVENTION

- (7) The land plane of the present invention is used to smooth and level any irregularities in the surface of an agricultural field. The land plane of the present invention includes a main frame, a first wing frame attached to the first side of the main
- 20 frame adjacent the front end thereof, a second wing frame attached to the second side of the main frame adjacent the rear end thereof, a V-shaped scrapper blade having an apex adjacent the front end of the main frame, a first transverse scrapper blade extending diagonally from the first wing frame across the main frame to the second wing frame and

having a gap adjacent the second side of the main frame, and a second transverse scrapper blade means extending diagonally from the first wing frame across the main frame to the second wing frame, parallel to and spaced rearwardly from the first transverse scrapper blade. The preferred embodiment of the present invention can be

5 described as an off-set wing land plane having a main frame approximately 40 feet (12.2 meters) long, 16 feet (4.9 meters) wide, with an overall width of 34 feet (10.4 meters) when the wings are folded down to deployed, in-use positions. The right wing is located toward the front of the main frame, and the left wing is located toward the rear of the main frame so that a pair of parallel blade means can extend diagonally across the land
10 plane at a 1-to-1 or 45° rearward angle.

(8) It is an object of the present invention to provide a land plane having a cylinder on the front hitch to level the land plane in the field and to transport the land plane down the road.

(9) It is another object of the present invention to provide an off-set wing land plane
15 that has a relatively short main frame to provide good maneuverability and allow a greater width to be covered in the field.

(10) It is another object of the present invention to provide an off-set wing land plane that has a V-shaped front blade to act as a stabilizer for two following parallel blades.

(11) It is another object of the present invention to provide an off-set wing land plane
20 that pulls from the top of the main frame, rather than from the bottom (ground level) thereof.

(12) It is another object of the present invention to provide an off-set wing land plane that is easier to transport and can cover approximately twice as many field acres as existing land planes in the same length or period of time.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

(13) Fig. 1 is a somewhat diagrammatic top plan view of the land plane of the present invention, with the wings thereof shown in a lowered, deployed position

(14) Fig. 2 is a top plan view similar to Fig. 1, but with the wings of the land plane of the present invention shown in a raised, transport position.

(15) Fig. 3 is a right side elevational view of the front end of the land plane of Fig. 1 on a somewhat larger scale with portions broken away or omitted for clarity.

(16) Fig. 4 is a right side elevational view of the rear end of the land plane of Fig. 1 on a somewhat larger scale with portions broken away or omitted for clarity.

DETAILED DESCRIPTION OF THE INVENTION

(17) A preferred embodiment of the land plane of the present invention is shown in Figs. 1-4 and identified by the numeral **11**. The phrase "land plane" is used herein to refer to an agricultural apparatus for movement over a field or the like to smooth and level any irregularities in the surface **S** of the field, sometimes also referred to as a "land smoother," etc. The land plane **11** of the present invention is especially designed to be pulled by a tow vehicle **V**, e.g., a typical agricultural tractor, over the surface **S** of the agricultural field to smooth and level any irregularities in the surface **S** of the field.

(18) The land plane **11** comprises, in general, a main frame **13**, a first wing frame **15** attached to one side (e.g., the right side) of the main frame **13**, and a second wing frame **17** attached to the other side (e.g., the left side) of the main frame **13**. The first and second wing frames **15**, **17** are preferably pivotally attached to the main frame **13** so that the land plane **11** can be pivoted between a deployed, in-use position (see, in general,

Fig. 1) for being moved over an agricultural field to smooth and level any irregularities in the field, and a folded, transport position (see, in general, Fig. 2) for being moved over a road or the like to or away from the agricultural field, etc. The first and second wing frames **15**, **17** are preferably off-set from one another and arranged diagonally across from one another at approximately a 45° angle (1-to-1 slope) with the first wing frame **15** located generally adjacent the front of the main frame **13** and with the second wing frame **17** located generally adjacent the rear of the main frame **13**. The preferred embodiment of the land plane **11** has an overall width of approximately 34 feet (10.4 meters) in the deployed, in-use position, and just over approximately 16 feet (4.9 meters) in the folded, transport position, with an overall length of approximately 38 feet (11.6 meters), as opposed to common prior art land planes which typically have an overall width of 16 to 20 feet (4.9 to 6.1 meters), and an overall length of 50 to 80 feet (15.2 to 24.4 meters). The differences in length and width make the land plane **11** of the present invention easier to transport over roads and maneuver in fields than such prior art land planes, while being capable of covering approximately twice as many field acres than such prior art land planes in the same period of time.

(19) The main frame **13** preferably consists of an open framework constructed out of 4 by 8 inches (10.16 by 20.32 centimeters) metal tubing cut and welded to have a front end **19**, a rear end **21**, a first side **23**, and a second side **25**. When viewed from the top as shown in Figs. 1 and 2, the main frame **13** may have the basic shape of an open rectangle with a generally V-shaped front end **19**. Various braces **27** may be provided to reinforce and strengthen the main frame **13**, etc. A hitch **29** is preferably provided at the front end **19** of the main frame **13** to allow attachment of the land plane **11** to the tow vehicle **V**. The hitch **29** may include an elongated tow bar **31** having a vertical aperture **33** or other

hitch structure at the front end thereof for being attached to coacting hitch structure of the tow vehicle **V**, an intermediate bar or member **35**, a first pivot rod **37** for pivotally attaching the tow bar **31** to the intermediate bar **35**, and a second pivot rod **39** for pivotally attaching the tow bar **31** to the front end **19** of the main frame **13**. A hydraulic cylinder **41** or the like is preferably mounted between the main frame **13** and the intermediate bar **35** (see Figs. 1-3) for pivoting the intermediate bar **35** about the pivot rod **39** so that the land plane **11** can be leveled in the field, etc., as will now be apparent to those skilled in the art. The hitch **29** is located generally at the top of the land plane **11** so that when towed by the tow vehicle **V**, the land plane **11** is pulled from the top thereof, rather than the bottom.

(20) Ground engaging lower frame members or runners **43** may be mounted to portions of the main frame **13** (e.g., beneath the rear first side **23** and front second side **25** perimeter or border of the main frame **13**) via braces **45** (see, in general, Fig. 4) to support the main frame **13** above the surface **S** of the field. Support wheels **47** are preferably attached to the main frame **13** to coact with the runners **43** in supporting the main frame **13** above the surface **S** of the field. Hydraulic cylinders **49** (shown diagrammatically in Figs. 1 and 2) or the like are preferably associated with the support wheels **47** to allow vertical adjustment of the support wheels **47** so that the support wheels **47** can be extended to fully support the main frame **13**, and the entire land plane **11**, when the land plane **11** is pulled over roads or the like.

(21) Each wing frame **15**, **17** also preferably consists of an open framework constructed out of 4 by 8 inches (10.16 by 20.32 centimeters) metal tubing or the like, cut and welded to have the basic shape of an open, skewed rectangle when viewed from the top as shown in Fig. 1. Each wing frame **15**, **17** is preferably pivotally attached

to the respective side **23, 25** of the main frame **13** via a hinge/hydraulic cylinder means **51** to allow the operator of the land plane **11** to move the wing frames **15, 17** between the deployed, in-use position and the folded, transport position as will now be apparent to those skilled in the art. The hinge/hydraulic cylinder means **51** are shown

5 diagrammatically in the drawings and could take several specific forms now apparent to those skilled in the art, such as the hydraulic folding system 92 and master linkage 100 structure disclosed in Dunn et al., U.S. Patent 5,213,165, issued May 25, 1993, incorporated herein by reference.

(22) Ground engaging lower frame members or runners **53** may be mounted to

10 portions of each wing frame **15, 17** (e.g., beneath the outer and rear perimeter or border of each wing frame **15, 17**) via braces **55** (see, in general, Figs. 2 and 3) to support the wing frames **15, 17** above the surface **S** of the field. Support wheels **57** are preferably attached to each wing frame **15, 17** to coact with the runners **53** in supporting the wing frames **15, 17** above the surface **S** of the field.

15 (23) The land plane **11** includes a V-shaped scrapper blade means **59** having an apex **61**. The V-shaped scrapper blade means **59** is mounted to and beneath the main frame **13** with the apex **61** adjacent the front end **19** of the main frame **13** substantially centered between the first and second sides **23, 25** of the main frame **13** (see Figs. 1 and 2), via braces **63** or the like. The V-shaped scrapper blade means **59** may be formed by a first
20 straight scrapper blade **65** mounted to and beneath the main frame **13** with the inner end thereof located at the apex **61** and with the outer end thereof extending rearwardly and outwardly from the apex **61** towards the first side **23** of the main frame **13**, and a second straight scrapper blade **67** mounted to and beneath the main frame **13** with the inner end thereof located at the apex **61** and with the outer end thereof extending rearwardly and

outwardly from the apex **61** towards the second side **25** of the main frame **13**. Thus, the apex **61** may be formed by the overlapping or butted inner ends of the scrapper blades **65, 67**.

(24) The land plane **11** includes a first transverse scrapper blade means **69** mounted to and beneath the main frame **13**, the first wing frame **15**, and the second wing frame **17** via brackets **70** or the like. The first transverse scrapper blade means **69** extends diagonally from the first wing frame **15** across the main frame **13** to the second wing frame **17**. A critical feature of the present invention is that the first transverse scrapper blade means **69** has a gap **71** adjacent the second side **25** of the main frame **13** (see Fig. 1). The first transverse scrapper blade means **69** preferably includes a first scrapper blade **73** mounted to and beneath the first wing frame **15**, a main scrapper blade **75** mounted to and beneath the main frame **13**, and a second scrapper blade **77** mounted to and beneath the second wing frame **17** with the gap **71** of the first transverse scrapper blade means **69** formed between the main and second scrapper blades **75, 77**. The first and second scrapper blades **73, 75** are designed so that when the wing frames **15, 17** are moved between the deployed, in-use position and the folded, transport position, the first and second scrapper blades **73, 77** will move with the respective wing frame **15, 17**. The adjacent ends of the first and main scrapper blades **73, 75** are designed so that they will overlap or abut one another when the first wing frame **15** is in the deployed, in-use position as shown in Fig. 1.

(25) The land plane **11** includes a second transverse scrapper blade means **79** mounted to and beneath the main frame **13**, the first wing frame **15**, and the second wing frame **17** via braces **81** or the like. The second transverse scrapper blade **79** is positioned parallel to and spaced rearwardly from the first transverse scrapper blade means **69**, and

extending diagonally from the first wing frame **15**, across the main frame **13** to the second wing frame **17**. The second transverse scrapper blade means **79** preferably includes a first scrapper blade **83** mounted to and beneath the first wing frame **15**, a main scrapper blade **85** mounted to and beneath the main frame **13**, and a second scrapper blade **87** mounted to and beneath the second wing frame **17**. The first and second scrapper blades **83**, **87** are designed so that when the wing frames **15**, **17** are moved between the deployed, in-use position and the folded, transport position, the first and second scrapper blades **83**, **87** will move with the respective wing frame **15**, **17**. The adjacent ends of the first and main scrapper blades **83**, **85** and the main and second scrapper blades **85**, **87** are designed so that they will overlap or abut one another when the wing frames **15**, **17** are in the deployed, in-use position as shown in Fig. 1.

(26) The land plane **11** may be constructed in various manners and out of various materials as will now be apparent to those skilled in the art. Thus, for example, as hereinabove mentioned, the main frame **13** and wing frames **15**, **17** may consist of open frameworks constructed out of metal tubing or the like, cut, welded and reinforced as desired. The various scrapper blades are preferably off-the-shelf type agricultural blades and may be joined to the respective frames **13**, **15**, **17** in a manner that allows independent adjustment for height and tension, if desired, in any typical manner now apparent to those skilled in the art.

(27) The operation of the land plane **11** is as follows: First, the land plane **11** is joined to the tow vehicle **V** via the hitch **29**. Because the hitch **29** is part of the upper portion of the main frame **13**, the land plane **11** will be pulled by the tow vehicle **V** from the upper portion of the main frame **13** rather than the bottom or ground level as required by prior art land planes. The various hydraulic components of the land plane **11** can be

connected to the hydraulic system of the tow vehicle **V** to allow the driver of the tow vehicle **V** to easily operate and control the land plane **11**. The wing frames **15, 17** can be raised to the folded, transport position for being pulled over roads, highways, etc., to the agricultural field to be planed. Once at the agricultural field to be planed, the wing

5 frames **15, 17** are lowered to the deployed, in-use position, and the land plane **11** is then pulled over the surface **S** of the field. The layout and position of the various blade means **59, 69, 79** are critical to the present invention and provides important benefits. First, the forward, V-shaped scrapper blade means **59** acts as a stabilizer for the two, parallel transverse scrapper blade means **69, 79**. Also, the specific layout of the blade means **59,**
10 **69, 79** causes dirt to flow substantially as indicated by the arrows in Fig. 1. That is, the V-shaped scrapper blade means **59** will both act as a stabilizer and cause dirt to flow outward and rearward to the first transverse scrapper blade means **69** in the direction of arrows **89** in Fig. 1. The first transverse scrapper blade means **69** will cause dirt to flow generally rearward and toward the left or second side of the land plane **11** as indicated
15 by arrows **91** in Fig., 1, but with a portion of the dirt flowing through the gap **71** in the first transverse scrapper blade means **69** as indicated by arrows **93** in Fig. 1. The second transverse scrapper blade means **79** will also cause dirt to flow generally rearward and toward the left or second side of the land plane **11** as indicated by arrows **95** in Fig. 1.

(28) Although the present invention has been described and illustrated with respect to
20 a preferred embodiment and a preferred use therefor, it is not to be so limited since modifications and changes can be made therein which are within the full intended scope of the invention.